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The Files - RD-122, T.O. 1

23 April 1959

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Trip Report - AS-3 Tests

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1. During the week of 16 March and 23 March 1959 the writer visited [redacted] and [redacted] to demonstrate the Automatic Agent Set, AS-3, and participate in initial on-the-air tests. This report summarizes the results of these tests and preliminary field reaction to the AS-3. Detailed operational reports will be submitted by the field.

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2. An agent signal plan prepared by [redacted] provided four contacts daily, with [redacted] acting as base and field on alternate days. Both stations were equipped to transmit Hellschreiber so that full two-way testing was accomplished. A 100-foot long-wire antenna was used with each AS-3 field unit.

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3. The on-the-air portion of these tests was most satisfactory. The contents of the storage in the agent set were consistently transferred to the base station recorders without perceptible distortion. Signal strength from each field set was excellent and light to medium QRM did not interfere with transcription of the recorded signals. No severe interference was encountered on the six field frequencies selected at random for the tests. Unfortunately, the insertion of messages into the storage of the agent set was hampered by erratic operation of the CO-3, the dot-dash coder used in the AS-3. Both the [redacted] agent set (Serial No. 515) and the [redacted] set (Serial No. 514) suffered from this defect in the coder. Slow and deliberate manipulation of the CO-3 was necessary to avoid errors in the Morse characters inserted into the tape cartridge, and wide variation was evident in the "touch" of different operators. Although this was the chief shortcoming of the field equipment, a number of other equipment defects were uncovered during the tests and are described in detail below.

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4. Several notable successes emerged from the testing program. On at least one occasion, a 60-group message was transmitted by [redacted] as part of its initial call-up and successfully recorded by [redacted] without two-way contact being established. The field station was on the air during this contact for only 22 seconds: 10 seconds of IDY (recognition) and 12 seconds of message. Experienced base operators were able to tune in on the field IDY signal in as little as 3 seconds on several occasions. Both areas appeared satisfied with the general size and operating characteristics of the AS-3, although [redacted] reported that the encoding procedure was slower than it had anticipated.

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The AS-3 proved itself capable of transmitting excellent Morse characters, and several messages were practically error-free. The coder's unreliability made it impossible, however, to maintain low error rates in the field transmission.

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5. Both [redacted] transmitted Hellschreiber for base-to-field traffic, and despite minor transmitter difficulties at both stations, the feasibility of field reception on the TP-3 was well established. The use of Hellschreiber for operating signals, however, was found to be cumbersome at both field and base ends, and there was universal agreement after the tests that simplified aural signals - such as out numbers - should be used by the base to indicate QSV, QRV, QSL, etc., to the field. Better TP-3 performance was observed at [redacted] than at [redacted] since the tape speed of the [redacted] TP-3 was erratic.

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6. The absence of AVC in the RR/D-11 was a handicap in copying Hellschreiber because of the narrow dynamic range of the TP-3. After the receiver and TP-3 gain controls had been adjusted for good printing, normal transmission fading, for which the RR/D-11 does not compensate, resulted in blank spots in the tape. At first we tried to catch every character by "riding gain" on these fades, but operator over-adjustment was soon found to be a much more serious factor in tape errors than normal fades or interference bursts. Since the base station transmitted its traffic from looped tapes, it became standard practice for the field to copy 3 or 4 runs on the TP-3 before breaking with a QSL. Side-by-side comparison of successive runs, (which matched up readily since the tapes were all the same length) allowed the operator to ignore fading, interference or printed garbles on one run by picking up the correct text at the same spot on another.

7. Both stations were most anxious about the status of the reusable TP-3 tape and felt that the operational usefulness of the TP-3 would be greatly increased when reusable water washable tape is available. The field was promised sample tape rolls and ink as soon as they are received. Insertion of tape into both TP-3 units was extremely difficult and time consuming, and the field requested that a better method be investigated for threading tape into the TP-3.

8. The RR/D-11 receivers had poor resettability on Band II and poor calibration accuracy on both bands. Errors as high as 30 kc in dial calibration were noted. The excellent sensitivity, battery economy and small size of the receiver, however, were subjects of favorable comment at both [redacted]. The SP/SA group at [redacted] used an RR/D-11 on a field problem and returned with high praise for its performance.

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9. The CV-13 converters sent to [redacted] were found to be unusable above 150 wpm due to severe ringing which caused the echo of one pulse to fill in the space to the next pulse. Because of this difficulty in

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both [ ] CV-13's, due perhaps to internal misalignment or narrow signal filters, the RBR-13 was used, with excellent results, at [ ] is awaiting instructions regarding the disposition or repair of its two CV-13's. On the other hand, no difficulty whatever was encountered at [ ] with the CV-13. Both stations criticized the ON-OFF labelling of the standby switch which must be turned to OFF for normal operation. A return to "STANDBY-OPERATE" as used in the RBR-13 was suggested. The CV-13 was very well received at [ ] where it is finding continuous use on high-speed training circuits. It is considered by the field to be a marked improvement over the RBR-13 but it is the writer's opinion that fuller operator familiarity with the CV-13 is responsible in large part for its better reputation.

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10. Informal discussions with [ ] and [ ] personnel resulted in the following field suggestions for improving the AS-3:

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- a. The CO-3 coders used in these tests were both faulty, and there was unanimous agreement that their operation should be improved. [ ] favors a coder which the skilled operator can use more rapidly than the CO-3, and would like to see, as an accessory unit for the system, an AS-3 coder with a straight Morse key used as the input device.

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- b. It became apparent early in the tests that tuning the AS-3 in a new frequency or antenna took longer than transmitting a full 125-group message. [ ] and [ ] requested we investigate a very low power TUNE position, or a high speed crank or slider for turning the pi-output inductor. With the recessed thumbscrew presently used, it takes at least 60 seconds to search the full inductance range for maximum output.
- c. Both stations recommended that break-in be provided in production AS-3's to simplify the operation of the system. The SEND-RECEIVE switch now used makes conventional Morse operation awkward, and appeared to [ ] to be an unnecessary additional step in automatic operation.

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- d. [ ] recommends an accessory cable which would permit an operator to assemble only his receiver, printer and power source for receiving blind broadcasts.

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- e. [ ] inquired whether a small 60-cycle filter box could be built to plug between the BC-3 battery charger and the RR/D-11 for AC operation of the receiver. The BC-3 provides 12 vdc from 70 to 270 vac but contains no hum filters.

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- f. [ ] asked whether a burial container had been designed for the AS-3. The BC-3 series of containers were said to be highly satisfactory for caching the RS-1 and RS-6.

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g. Neither [redacted] nor [redacted] use the HC-6/U crystal holders for which the AS-3 is designed. It was recommended that we re-examine the two-year-old decision to use sockets for unmodified HC-6 crystal holders on all agent equipment, since [redacted] had information that T&I had recently purchased 70,000 modified HC-6/U holders which will not fit into the AS-3, or for that matter, any of our recently developed equipment. Makeshift adapters were used for AS-3 crystals during these tests.

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h. [redacted] made the suggestion that the TP-3, which has an input impedance of 25,000 ohms, be equipped with an alternate input of 8 ohms impedance for operation directly from the voice coil of short wave receivers such as those widely used in [redacted].

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11. Both [redacted] and [redacted] responded favorably to the writer's suggestion that several US-to-Europe AS-3 shots be made sometime in April or May. They asked that contact times and frequencies be cabled a day or two in advance and suggested 1300 Z as a favorable time for receiving U.S. signals. One-way transmission only is contemplated.

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